**\*\*Angle bisector theorem**: A point P is on the angle bisector of an angle  if and only if the distances from *P* to the sides  and  are equal.

Picture of what this means:

If then

 

And if then

 

**Angle bisectors of a triangle intersect theorem**: The 3 angle bisectors in a triangle intersect at a single point.

|  |  |
| --- | --- |
| Proof:Given : a triangle  Name and construct the angle bisector of  to be  Name and construct the angle bisector of  to be  Name and construct the intersection of these first two angle bisectors to be  *(Note: if two lines aren’t parallel, so it’s safe to say that* ***two*** *angle bisectors in a triangle intersect)*Name and construct perpendicular lines from *F* to each of the sides:  Because  bisects  we know  \*\*Because  bisects  we know  \*\*Because  and  we know Because , we know  bisects \*\*So we know that all of the angle bisectors meet at F.\*\*Each of these statements is a result of the angle bisector theorem (top of page) |  |

You will be using (and not proving) this first theorem:

**Perpendicular bisector theorem**: A point P is on the perpendicular bisector of a segment  if and only if the distances from *P* to the vertices *A* and *B* are equal.

Picture of what this means:

If then

 

And if then

 

You will be proving:

**The perpendicular bisectors of sides of a triangle intersect** (Prove that in any triangle the perpendicular bisectors of the 3 sides of the triangles all meet at a point).